PRELIMINARY TEST RESULTS ON A CLOSED-LOOP CONTAMINANT REMOVAL SYSTEM FOR PROCESSING OF METALLIC MELTS

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Processing of metallic melts in microgravity containerless experiments requires control of contaminants like oxygen and water vapor to below parts-per-billion (ppb) levels. A significant fraction of contaminants in such materials processing is expected to be generated through outgassing from the heated sample or other parts of the experimental hardware. For space-based experiments, the sample environment control should be achieved with a minimum penalty in system weight and with minimal effluent streams. A closed-loop system for the removal of trace quantities of oxygen and water vapor which uses replaceable cartridges of zeolite-based sorbents has been designed and fabricated. Systematic tests, with the objective of developing a prototype, have been conducted with a controlled contamination load generated from outgassing of selected metal samples.